

THURSDAY, DECEMBER 20, 1883

MERRIFIELD'S "TREATISE ON NAVIGATION"

A Treatise on Navigation for the Use of Students. By John Merrifield, LL.D., F.R.A.S., F.M.S. (London: Longman and Co., 1883.)

THE author of this volume having been engaged for many years in preparing candidates for the different examinations into which navigation enters, has felt the want of a text-book embracing all that the different examining boards embody under that head, and has endeavoured, and we think successfully, to supply that want by the present treatise.

The work, although entitled "A Treatise on Navigation," deals only with one part, viz. that particularly relating to what is generally known under the name of dead reckoning, and does not touch on astronomical observation, which we presume Mr. Merrifield classes under the head of nautical astronomy, but which is really the most important part of navigation. The title therefore is somewhat misleading. Neither do we agree with the author's definition of theoretical and practical navigation; what Mr. Merrifield terms practical navigation, viz. the management of the ship, making and shortening sail, steering, &c., is usually known as seamanship. The theory of navigation is surely the proving that by the application of certain problems the particular position occupied by a vessel can be accurately ascertained; whilst the practice is the actually finding the ship's place by means of the instruments necessary to give the data required by the theory.

But although some small points in the work may be selected which may perhaps offend the practical navigator confident in his own ability, and consequently too much inclined to look down on the instructions of schoolmen, to whom he is far more indebted than he is generally disposed to admit, to the student this work will be found most useful: the chapters are well arranged, the exercises at the end of each chapter are pertinent to the preceding text, and require him to digest the text in order to answer them satisfactorily. We propose, however, to offer some remarks and suggest some additions which the author may perhaps consider should another edition of his work be required.

In the description of the compass one type only has been selected—that in use in the mercantile marine. No account is given of the instruments used in the navy or of Sir William Thomson's invention. This is certainly a defect in the work, as if one instrument can be considered as of more importance than another, in the navigation of a vessel, it is the compass. Without it, notwithstanding all the other improvements which have taken place in navigation, we should be in much the same position as the seamen of old, who were afraid to venture out of sight of land. In fact we have always thought that the education of naval men so far as regards the compass, and magnetism generally, has been very much neglected, and its vast importance has hitherto not received that attention, in treatises on navigation, it deserves. Mr.

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Merrifield has made a great stride in advance, as he treats, in his ninth chapter, of the coefficients and the means of correcting the compass for the local attraction of the ship. This is a subject of great importance in the present day; all navigators should be able to adjust their own compasses, and should have the means of doing so at their disposal, as a compass might be disabled in any vessel, and in war-ships, particularly, a general action might cause the loss of the correcting magnets of every vessel in the squadron, when, unless some officer on board could replace them, and correct the compasses, the fleet might be placed in a most critical position, more especially in thick weather or when entangled amongst shoals. We doubt if the latter contingency has yet excited any attention, yet its importance will be at once seen if we suppose that one ship only in a squadron has had her compass disabled in action and that subsequently thick weather prevails. Such a ship endeavouring to obey the signals of the admiral might either fall into the enemy's hands or by fouling vessels in her own squadron temporarily render them unfit to renew the engagement.

Whilst considering this contingency, it might perhaps be as well to draw attention to the fact that, in addition to our ironclads, many large steam-vessels are now fitted with sirens in place of the ordinary steam-whistle. It would therefore seem expedient that some definite means should be enforced to prevent their signals being mistaken for the sirens sounded in foggy weather from lighthouses and lightships.

In describing the mode of correcting the compass for the effect of local attraction no notice is taken of the method of doing so by a single magnet—often adopted in the navy. We are, however, glad to see that Mr. Merrifield refers the student to the works of Sir George Airy and Sir Frederick Evans, to both of whom sailors owe a debt of gratitude. That we are able to navigate our large iron ships and armour-plated vessels with the same facility as the old wooden ships of the past is due almost entirely to their labours, combined with those of the late Archibald Smith, F.R.S.

In the chapters on the various methods of finding the position of a ship by dead reckoning, known as the "sailings," we do not find much improvement on the works of the older writers except in one particular—Mercator's sailing. This, which is the most accurate method of dead reckoning, is treated of in a separate chapter, and the formula for calculating the meridional parts for the spheroid, as well as the sphere, is now for the first time published in "A Treatise on Navigation," the only work of the sort in which we remember to have seen it before being Galbraith's "Surveying." It is true that Riddle, in a note, refers the student to Gauss's paper, published in the *Philosophical Magazine* for 1828, and Mendoza y Rios, in his tables, gives the meridional parts for the spheroid as well as the sphere, but does not say what compression he used in the calculation: Mr. Merrifield, however, seems to be the first to give the subject that prominence in "A Treatise on Navigation" we think it deserves, more especially now when the steamers running from England to the United States are reaching the extraordinary rate of 450 miles a day, and it is no unusual thing to be two or three days without obtaining astronomical observations. It therefore becomes

necessary to use the most rigorous means to calculate the position by dead reckoning, so that the errors of steering, &c., may not be augmented by errors in calculation. Such being the case, we regret that Mr. Merrifield has omitted from the chapter on traverse sailing the warning given in Raper that, especially in high latitudes, the differences of longitude should be found on each course, instead of the departures being lumped and the difference of longitude found from the result.

In the chapter on soundings and tides (No. 10), Mr. Merrifield has published the system of the late Sir Francis Beaufort for ascertaining the height of the tide at any moment provided we know the range and time of high water. This is the method generally adopted by surveyors when circumstances prevent their having a tide pole on shore, and is traditionally known amongst them, though not hitherto published. It is fairly accurate when the diurnal inequality is inconsiderable, and we can recommend it as being sufficient for all practical purposes in finding the depth of water to be added to the soundings on the chart in places like the Bristol and Irish Channels, where it is necessary, owing to the large ranges, to take the state of the tide into consideration in judging the position by soundings in foggy weather, or in calculating when a bank or flat can be safely crossed. The fact that in rivers or harbours certain winds affect the height and that atmospheric pressure also has an influence over tides may be safely ignored in the open sea, as their combined influence would probably never exceed half a fathom, but a range of from three to five fathoms can never be lightly considered by the careful navigator.

OUR BOOK SHELF

Farm Insects. Being the Natural History and Economy of Insects Injurious to Field Crops, and also those which Infest Barns and Granaries, with Suggestions for their Destruction. By John Curtis, F.L.S. Pp. 540, with 16 Coloured Plates, Royal 8vo. (London: John Van Voorst, 1883.)

THIS is simply a reissue of Curtis's classical work; it had long been "out of print" in booksellers' phraseology. It remains the best book on economic entomology that has appeared in this country, and has certainly served as a model for the Reports of various State entomologists on the other side of the Atlantic. No other author here has gone into the question of special injurious insects with the same care and minuteness, and it may be said that (with the exception of certain Reports issued in America) there is no similar collective work faithfully illustrated by the author's own pencil. The plates and woodcuts are in Curtis's best style, and if he had been an entomological artist only, his work would have remained unsurpassed.

Opinions may be divided as to the desirability of re-issuing such a work "untouched," when so many years have elapsed since the publication of the chapters in the *Proceedings of the Royal Agricultural Society* that formed its basis. Much and valuable additional information has been obtained since the original articles were written, and very much alteration in nomenclature has resulted from the efforts of systematists to place this branch of entomological science on a sounder footing, but the facts remain practically unaltered, and there is the charm of a certain originality in the author's style that any radical reconstruction might have destroyed.

Nevertheless we do think it a pity that some one could not have been found with sufficient knowledge and courage to re-edit the book and bring it down to date. On the

other hand, this process might have resulted in the work being no longer "Curtis's Farm Insects." Its value would be destroyed if rewritten, even by the most experienced, and we think the only practicable method of dealing with it in an absolutely new edition would be by means of copious annotations, not by recasting the whole.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Evolution of the Cetacea

I AM glad to be able to assure Mr. Searles Wood that I have long been familiar with the specimen called *Palæocetus sedgwicki*, preserved in the Woodwardian Museum at Cambridge, and have repeatedly examined it with much interest. It is undoubtedly Cetacean, and allied to the genus *Balenoptera*, as Mr. Seeley demonstrated, though differing in smaller size and some other characters from any existing species. As, however, the light it throws upon the evolution of the Cetacea is very small compared to the time that would have been taken up in discussing its bearings, I did not think it worth while to allude to it in a lecture of which the length was necessarily limited. It is, after all, a most unsatisfactory fragment, as its geological age is, and probably always will remain, a matter of doubt. Allowing, however, the utmost antiquity assigned to it, my argument would rather be strengthened than weakened. Mr. Searles Wood seems to have missed the fact that my chief contention was against the prevalent view that the Cetacea have been derived from the Carnivora through the Seals. Any evidence which throws back their origin in time and derives them from some more generalised type of mammals would militate against this view. No one can suppose that the Ungulata originated at the commencement of the Tertiary period, as we know that they were then already differentiated into great and distinct sections. Their primitive ancestry must therefore be looked for far back in Mesozoic times. That I thought the Cetacea existed before the Tertiary period I distinctly intimated by suggesting, as an explanation of the absence of their remains in the chalk, that they might then have been inhabitants of great inland waters, but having had so many warnings of the fallacy of negative evidence in geology, I do not yet despair of the discovery of a veritable Cretaceous whale.

W. H. FLOWER

The Java Eruption

I HAVE been greatly interested in your note on M. Renard's researches as to the composition of the volcanic material ejected during the recent eruption of Krakatoa. The ashes, as stated, are those of a magma that would have produced an andesite with rhombic pyroxene. Now such an andesite occurs at so many points, and in such immense masses, round the great Pacific "circle of fire," that one is tempted to ask if it may not specially characterise this important volcanic region. I will, with your permission, briefly refer to some published, and one or two unpublished, facts with regard to the distribution of this andesite (called hypersthene-andesite by Whitman Cross and Idings, and bronzite-andesite by F. Becke) round the Pacific circle.

In the *Neues Jahrbuch* for 1881 (*Beilage Band* 1881, 467) Dr. Oebbeke describes, under the term augite-andesite, a rock from the Sierra de Mariveles, Luzon. Owing to the kindness of the author, I have a section of this rock before me as I write, and I have little doubt that the strongly pleochroic mineral is mainly, if not entirely, a rhombic pyroxene. Augite, however, is also present.

Passing to the other side of the Atlantic, we have recent evidence to show that a rock of the same type occurs along the line of the Rocky Mountains and the Andes.

In *Bulletin No. 1 of the U.S. Geological Survey* (1883), Mr. Whitman Cross describes a hypersthene-andesite from Buffalo Peaks, Mosquito Range, Colorado.